

Correlation of Varicocele with Abnormal Semen Parameters in Young Infertile Pakistani Males

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Objective: To study the occurrence and correlation of varicocele with abnormal semen parameters in young infertile males.

Study design: Cross sectional study

Place and duration of study: Department of Physiology, University of Health Sciences, Lahore from 2009 - 2010

Subjects and methods: The study was carried out in 99 infertile males with male factor infertility who reported to the infertility clinics of Combined Military Hospital and General Hospital, Lahore and fulfilled the inclusion criteria. Complete history was obtained along with thorough physical examination. Semen analysis of all subjects was done.

Results: Physical examination and scrotal ultrasound performed on 99 infertile male subjects revealed that 35 men had varicocele. Among these 35 men, 16 men had concurrent oligospermia while 19 were asthenozoospermic. Testes of these subjects were relatively smaller than the infertile male without varicocele.

Conclusion: It was concluded that the occurrence of varicocele was seen in (34.5%) of infertile subjects. Infertile males with varicocele had abnormal semen parameters, like decreased motility and sperm concentration. Testicular volume of these subjects was lesser as compared to infertile men without varicocele.

Keywords: Male factor infertility, Varicocele, Semen abnormalities, Testicular volume

INTRODUCTION

The basic foundation of a family is based on parenthood. Infertility is defined as the inability to conceive after at least 12 months of unprotected intercourse¹. The prevalence of infertility in the world is estimated to be 8-12%² and globally one out of every 6 couples requires investigations for infertility. Among these, 25 % cases are due to female factors, 40-50% are due to male factors alone³, 20% are due to a combination of female and male factors and 10% remain un-explained^{4,5}. The primary investigation for the assessment of male factor infertility is the semen analysis. The parameters of semen analysis are volume, sperm concentration, motility and morphology. An abnormality in sperm count is referred to as azoospermia (no sperm) or oligozoospermia (less than 20 million/ml)¹. These are found to be associated with an increased frequency of sperm chromosomal abnormalities⁴. Any motility disorder is known as asthenozoospermia and

various morphological abnormalities are grouped as teratozoospermia. A person can suffer from any one or more of these problems⁶.

A very important, commonly occurring and surgically correctable lesion associated with male infertility, is varicocele⁷. In one third of infertile male population, varicocele is responsible for infertility. Varicoceles, present in 15–20% of men, are characterized as abnormal dilatation of the veins of the pampiniform plexus⁸. Regarding their etiology, there is a lot of controversy. It is assumed that in the formation of varicoceles, there is interplay of multiple factors⁷. Several anatomical features of the testicular venous system may contribute to causing dilatation and tortuosity of these vessels. Varicoceles are present about 90% on the left side Bilateral varicoceles are present in 15% to 50% of cases, but right sided isolated varicoceles are fairly rare⁸. The upright posture of humans and the anatomy of the left spermatic vein system may also predispose them to varicocele due to the length of the internal spermatic veins and effects of gravity⁸.

Dysfunctional valves, or complete absence of valves seem to be associated with the development of varicocele⁸. A number of changes occur in the testicular microenvironment due to presence of varicocele. Varicocele increases the level of reactive oxygen species (ROS) which results in poor sperm

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quality⁹. Apoptotic mechanisms originating in the mitochondria of spermatocytes, function in the nucleus of the cells and damage nuclear DNA in men with varicocele¹⁰. Varicocele affects the physiology and reproductive capacity of spermatozoa as well as the fertilizing capacity of the haploid male gamete⁸. Varicocele induces germ cell injury due to raised intra-testicular temperature and loss of normal spermatogenesis over time¹¹.

Varicocele predisposes testis to a greater degree of cell injury by acting as a cofactor with gonadotoxins. Varicocele whether unilateral or bilateral, after surgical correction, results in improvement not only in spontaneous and assisted pregnancy rates but also in semen parameters¹². The clinical significance of this cause relates not only to its common occurrence but also to its element of possible reversal with surgical intervention¹². Impairment of semen parameters like sperm count, sperm motility, and morphology needs examination of infertile males to rule out varicocele⁸.

This study was planned to see the occurrence and correlation of varicocele with abnormal semen parameters in young infertile Pakistani males.

SUBJECTS AND METHODS

This comparative study was carried out on subjects selected from infertility clinics of CMH and Lahore General Hospital, Lahore. These included 99 males of 20-40 years, with abnormal semen parameters seeking advice for infertility of more than 2 years duration. Infertile males with period of infertility less than one year, genitourinary trauma and surgery with any abdominal pathologic conditions, such as malignancy and other chronic diseases were excluded.

Semen samples were obtained from all subjects. Semen samples were collected after 3 days abstinence from sexual intercourse. Samples were collected in sterile containers and allowed to liquefy at 37°C for 30 minutes. Semen analysis was performed within one hour of sample collection in the laboratory of department of Physiology and Cell Biology, University of Health Sciences, Lahore.

During physical examination, few varicoceles were caught on inspection, while others were identified upon palpation without bearing down. A few cases however were detected only by bearing down, which increased the intra-abdominal pressure to increase the size of varicocele. Ultrasound examination was performed with the subject in the upright position and breathing spontaneously.

Values of various parameters are presented as mean±SD. Student's t-test and the One Way Anova

paired test were used for statistical evaluation, p<.05 was considered statistically significant.

RESULTS

The age distribution of 99 infertile male with abnormal semen parameters is shown in (figure 1). Mean±SD age of infertile men with varicocele was 29.14±2.16 years, while in infertile men without varicocele it was 31.52±2.71 (Figure 2).

Table 1: Percentage distribution of semen abnormality

Semen Result	Frequency	%age
Asthenozoospermia	31	31.3
Azoospermia	19	19.1
Oligozoospermia	23	23.2
Teratozoospermia	20	20.2
Oligoasthenozoospermia	6	6
Total	99	100

Table 2: Comparison of semen parameters and testicular volume between infertile men with and without varicocele

Semen Parameters	Infertile men with varicocele (n = 35)	Infertile men without varicocele (n=64)	p-value
Semen volume (ml)	2.62 ± 0.26 (2.4 – 3)	3.11 ± 0.28 (1.5 – 2.8)	0.37
Semen PH	7.4 ± 0.17 (7.2 – 7.8)	7.36 ± 0.17 (7.2 – 7.8)	0.19
Sperm concentration (millions / ml)	26.9 ± 13.61 (14 – 60)	30.7 ± 21.57 (0 – 60)	0.01 *
Sperm motility (%)	24.28 ± 10.51 (10 – 40)	30.47 ± 27.37 (0 – 80)	0.001*
Sperm morphology	27.14 ± 14.05 (20 – 80)	36.25 ± 15.81 (20 – 80)	0.08
Testicular volume (ml)	20.7 ± 1.85 (18 – 24)	22.12±1.84 (18 – 25)	0.01*

* significant

As shown in table 1, the 99 males having male factor infertility were subclassified as having asthenozoospermia 31(31.3%), azoospermia 19(19.2%), oligoazooteratozoospermia 6(6.1%), oligospermia 23(23.2%) and teratozoospermia 20(20.2%).

Physical examination and scrotal ultrasound performed on 99 infertile male subjects revealed that 35(34.5%) subjects had varicocele.

No significant difference (p>0.05) was observed in the semen volume of infertile men with varicocele 2.62±0.26 and in infertile men without varicocele 3.11± 0.28

Sperm concentration was significantly lower ($P < 0.05$) in infertile men with varicocele 26.9 ± 13.61 (million / ml) than in infertile men without varicocele 30.7 ± 21.57 (million / ml) (Table 2).

Sperm motility was significantly less ($P < 0.05$) in infertile men with varicocele $24.28 \pm 10.51\%$ than in infertile men without varicocele $30.47 \pm 27.37\%$ (Table 2).

No significant difference ($p > 0.05$) was observed in sperm morphology in infertile men with

varicocele 27.14 ± 14.05 and infertile men without varicocele 36.25 ± 15.81 (Table 2).

Testicular volume was significantly less ($P < 0.05$) in infertile men with varicocele $20.7 \pm 1.85\text{ml}$ than in infertile men without varicocele $22.12 \pm 1.84\text{ml}$ (Table 2). Left testicular size in men with varicoceles was significantly lesser than that of subjects without varicocele.

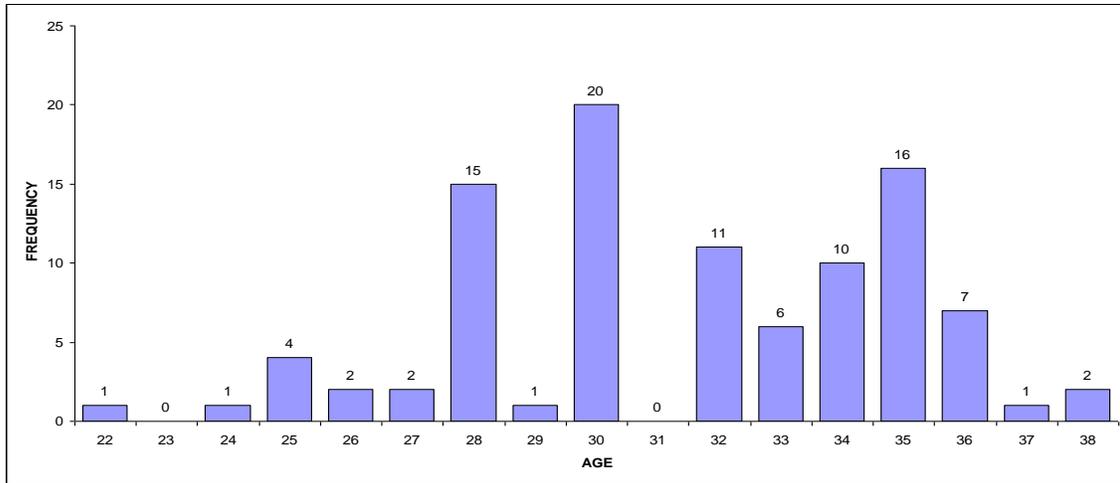


Figure 1: Age distribution of infertile men with abnormal semen parameters (n = 99)

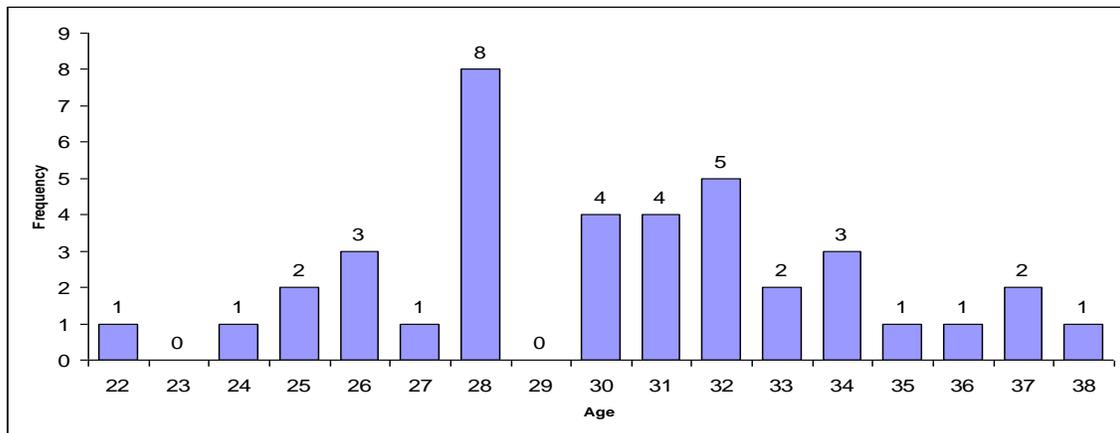


Figure 2: Age distribution of infertile men with varicocele (n = 35)

DISCUSSION

Aging has been considered to be factor responsible for decline in semen parameters. In present study, infertile males with varicocele belong to younger age group than infertile males without varicocele. Hence aging could not be the cause of impaired semen quality in present study group¹⁵. Varicocele is a vascular lesion which affects the reproductive capability of sperm. In the present study, 35(34.5%)

men were positive for varicocele. Among these 35 men, 16 men had concurrent oligozoospermia while 19 were asthenozoospermic. 30-40% infertile males had varicoceles in studies conducted by Jarow and Mohammad^{13,14}. In our study group of infertile male with varicocele, a decrease in the sperm concentration was found in 16 subjects, while motility of the spermatozoa was affected in 19 subjects. Decrease in sperm concentration may be due to increase apoptosis in testis with varicocele⁷. Sperm

concentration and motility is decreased affecting the semen quality in men with varicocele^{15, 19}. Varicocele produces excessive oxidative stress and sperm DNA damage in the seminal plasma¹⁶. Varicocelectomy is a proven measure in reducing this oxidative stress in seminal plasma and concurrent sperm DNA damage¹⁷. In infertile men with palpable varicocele, varicocelectomy significantly improves abnormal semen parameters¹⁸. Testicular volume (ml) recorded through ultrasonography was significantly lower in infertile men with varicocele than infertile men without varicocele ($p>0.05$), moreover varicocele and testicular hypotrophy was found in left testicle¹⁵. This finding is similar with the findings of Pasqualotto et al¹⁵. Patel and Sigman also quoted that left testicular hypotrophy is more common than right¹⁹. Sakamoto et al conducted a study to establish the relationship between testicular volume and varicocele among infertile males and concluded that left testicular varicocele was associated with ipsilateral hypotrophy²⁰. A sperm count should be performed every three months for one year or until pregnancy is achieved after the treatment of varicocele²¹.

CONCLUSION

We conclude that the occurrence of varicocele in infertile male is 34.5%. Abnormal semen parameters are present in subjects with varicocele and these may cause infertility.

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